

NEW NORTH AMERICAN CICADAS WITH NOTES ON DESCRIBED SPECIES*

BY WILLIAM T. DAVIS

STATEN ISLAND, N. Y.

Magiccada and Cænomyia

In June, 1928, brood II of the Seventeen-Year Cicada occurred on Staten Island, and the insects were in great numbers in the woods on the hillside forming the westerly rim of the Clove Valley. This area is now included in the Clove Lakes Park. On June 11 the writer visited the locality; saw several cicadas feeding on oak, and others on black birch, and was surprised to find the fly *Cænomyia ferruginea* Scopoli, or possibly it should be called *pallida* Say. This species had not been collected on the Island, and six females and two males were found; also the pupal skins of eleven females and thirteen males. The pupal skins were protruding from the ground where the cicadas were thickest, and it appeared that the predaceous fly larvæ must have been interested in them. On June 15 sixteen additional pupal skins of *Cænomyia* were collected at the same locality as those mentioned above. On June 17, 1928, the remains of a *Cænomyia* fly were discovered on top of a large boulder on Old Place meadow, about four miles to the west of Clove Valley, where it had been left by a bird.

In 1929 there were a few belated Seventeen-Year Cicadas in the Clove Valley, and on June 14 four female and two male *Cænomyia* pupal skins were collected. In 1930 no trace of *Cænomyia* could be discovered at the above mentioned locality, nor has the fly been found there again.

Brood II of the Seventeen-Year Cicada occurred in great numbers in 1911 in the Military Reservation at West Point, and while we did not associate it with *Cænomyia* at the time, it is of interest that on June 3 and 4 we collected 10 males and 9 females of *ferruginea*.

* I am indebted to Mr. Hans L. Stecher for drawing the text figures, and to Mr. Carlton Beil for taking the photographs.—W. T. D.

In 1936 Brood X of the Seventeen-Year Cicada appeared. They were particularly numerous in parts of western New Jersey and eastern Pennsylvania. On June 4, Dr. James P. Chapin and the writer found them very plentiful in a wood near Krumsville, Berks County, Pa., and associated with them were *Cænomyia* flies, and many fly pupal skins protruded from the ground among the numerous holes from which the cicadas had emerged.

In the "Bulletin of the Illinois State Laboratory of Natural History," Vol. XII, March, 1917, there is an article on the flies of the family Cænomyiidae by J. R. Malloch. It is there stated that *Cænomyia* larvæ feed on white grubs, and from the above mentioned observations they also appear to be interested in cicadas.

In Bulletin No. 71, U. S. Department of Agriculture, 1907, it is stated that during their subterranean existence the larvæ and pupæ of the Periodical Cicada, "when near the surface, are doubtless subject to the attacks of various predaceous coleopterous larvæ, and many of them are unquestionably destroyed by this agency." In the Proceedings Entomological Society of Washington, February, 1921, p. 44, F. C. Craighead records the rearing of the beetle *Sandalus niger* from a cicada pupa.

Tibicen marginalis (Walker). Variety **pronotalis**, new variety.
(Plate XXIV, Fig. 1.)

Type, male, Wasta, S. D., July 22, 1935 (P. W. Oman), collection U. S. National Museum.

Allotype, Elk Point, S. D., August 10, 1924 (H. C. Severin), collection Wm. T. Davis.

The species occurs from Ohio, Kentucky, Tennessee, Alabama and western Florida, westward to the Dakotas, Nebraska, Kansas, Oklahoma and eastern Texas. In this wide range it shows some variation and examples from the Dakotas, Iowa, Oklahoma and Nebraska are usually smaller and quite often have a rather large central black mark on the pronotum, more rarely present in specimens from Texas, Missouri, Tennessee, Illinois and Ohio, or in the eastern range of the species. An examination of about 100 specimens from Louisiana disclosed but two with an all black spot on the pronotum.

In the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY

for March, 1925, page 39, this variety of *Tibicen marginalis* was described as follows, but no name was proposed: "While the pronotum is often entirely green or yellowish-green in this species, there is a rather conspicuous color variety with an irregular oblong, black spot, centrally, extending backward to the collar. Black lines sometimes lead from this spot each side into the oblique grooves. This variety probably occurs throughout the range of the species, but is much more common near its northern limit. When freshly emerged this cicada may have a dorsal row of pruinose spots on the abdomen, as in *dorsata*, *dealbata* and *cultriformis*, but is easily separated from them by the more bent fore margin of the front wings, very broad head, form of the uncus, as well as by color characters."

Specimens with the black mark on the pronotum usually have the inverted *resh* shaped characters on the mesonotum considerably smaller than in those without the mark.

In 1927 the following specimens of *marginalis* were examined for Prof. H. C. Severin, Brookings, S. D., all from Elk Point, S. D.: male and four females, August 10, 1924; male June 24, 1926; male August 17, 1927. The allotype was of this lot, and the following note was made at the time: "All have clear black spot on the pronotum, except the 1927 male, where there is a pale spot included in the black one. This male more like those common to the southward." In the collection of the Museum of Zoology, University of Michigan, there is a typical female *pronotalis* collected along the Missouri River in Charles Mix County, South Dakota, by C. L. Hubbs, July 6, 1934, and in the collection of the University of Kansas there is a male and a female collected at Wasta, South Dakota, by M. B. Jackson, July 17, 1937.

In Oklahoma the variety here designated as *pronotalis* appears to be more numerous than the typical form, and six specimens have been examined from Osage, Pawnee, Le Flore and McCurtain counties, while three typical examples have been seen from Osage and McCurtain counties.

Recently Prof. H. E. Jaques, of Iowa Wesleyan College, sent me five typical *marginalis* from Polk, Muscatine and Henry counties, Iowa, and seven specimens of variety *pronotalis* from Monona and Linn counties, which were so strikingly different

from the typical form that a new variety name was considered desirable.

Cicada marginata was named by Thomas Say in 1825 from Missouri, and it is stated that the head and thorax [pronotum] are "greenish yellow slightly varied with black; scutel [mesonotum] black with the W and elevated X greenish-yellow." In 1852 Walker changed the name to *Cicada marginalis* to distinguish it from *C. marginata* Olivier of 1790. An account of the habits and distribution of *marginalis* is given in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY, June, 1935, pp. 176-178.

Tibicen cultriformis from southeastern Arizona and southwestern New Mexico, described and figured in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY, December, 1915, and March, 1925, bears a close resemblance to *T. marginalis* var. *pronotalis*, much more so than it does to typical *marginalis*. Each has a conspicuous black spot, though of slightly different shape on the pronotum, but the genitalia are quite unlike, and are as figured in 1915 on Plate 18.

MEASUREMENTS IN MILLIMETERS

Variety <i>pronotalis</i>	Male Type	Female Allotype
Length of body	37	33
Width of head across eyes	15	15
Expanse of fore wings	103	104
Greatest width of fore wing	17	17
Width of operculum	7	

***Tibicen paralleloides* Davis**

This species was described and figured in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY for March, 1934, and again mentioned in the June, 1936, number. Only two males, and one female supposed to belong to this species, had been examined previous to 1937, when Albert E. Maas sent me two males and three females collected in October at Compostela, Nayarit, Mexico, the type locality. Later a male from the same locality was received from Miss E. Rosenbauer.

From the brightly colored females that sex may be more fully described. On each side of the abdomen there is a minute prui-

nose spot at base; a large spot, as in the male on segment three, and a slightly smaller one on segment four. The notch in the last ventral segment is shallow, with a small round dark spot each side. These specimens lack the small but conspicuous red spots present in *T. parallela* along the sides of the abdomen, one on the hind margin of each segment.

Diceroprocta bicosta (Walker)

The localities of the two specimens from which Walker made the original description in 1850 were unrecorded, but Distant in Biol. Centr. Amer., Homoptera, 1881, figures as *bicosta* a female from Mexico, expanding 100 mm., and adds that the species also occurs in Costa Rica. The male was unknown to him. In the writer's collection of 15 specimens, there is but a single male. One female is without locality; the others were collected as follows: Tela Guaimas district, Honduras, May 2, 1923 (T. H. Hubell). Two additional females from Honduras are in the collection of the University of Michigan. One male, 9 females from Jojutla, Morelos, Mexico, June, 1929. Two females from Nayarit, Mexico, July 28, 1935, and October 12, 1935. Lastly a female found near Mission San Ignacio, Sonora, Mexico, July, 1936, about 40 miles south of Nogales, Arizona (Ned J. Burns).

This species will probably be found in the United States, and indeed has been reported from Key West, Florida, by P. R. Uhler. He states, Transactions, Maryland Acad. Sciences, 1892, page 154: "In my own collection there is a female from Key West, Florida, captured by Dr. E. Palmer, and a male from Cape St. Lucas, Lower California, from the cabinet of John Xantus deVesey." It is probable that the Key West specimen should be referred to *biconica* Walker, and the one from Cape St. Lucas to *digueti* Distant, described in 1906, after the publication of Uhler's paper.

Diceroprocta alacris (Stål)

The specific name *alacris* Stål appears as a synonym for a Mexican cicada under the name *transversa* Walker, but *alacris*, in our opinion, is the correct name for the species.

The first *Cicada transversa* was described by Germar in Thon's Ento. Archiv. 11, p. 7 (1830). According to Distant's Catalogue

of 1906, Germar's species equal *Cicada atra* of Olivier, described in 1790, and so became a synonym. This is a Palæartic species.

The second *Cicada transversa* was described from Vera Cruz, Mexico, by Walker in *Insecta Saundersiana*, Homoptera, p. 15 (1858). As this name had been used by Germar in 1830, it should not have been used again in 1858 it was a preoccupied name. *Cicada alacris* Stål, Stettin, *Ento. Zeitung*, XXV, p. 62 (1864), is next in priority as a name for this Mexican insect. The species was cited by Stål in 1870 as an example of his subgenus *Diceroprocta*. See JOURNAL NEW YORK ENTOMOLOGICAL SOCIETY, Dec., 1928, pp. 439-440.

In "Biologia Centrali Americana," Rhynch. Hom., page 7, Distant states that he is "indebted to Dr. Signoret for the opportunity of comparing *types* of this species with those of Walker in the British Museum." On page 9 he records that he had examined Stål's *type* and found it to be a synonym of *C. transversa* Walker. In the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY for 1928, plate XVII, there is a figure of the *type* of *transversa* Walker, received from the British Museum.

The original description of *alacris* calls for a blackish insect variegated with olivaceous, olivaceous yellow, or greenish olivaceous. The original description of *transversa* from Vera Cruz calls for a black insect variegated with testaceous. It states: "Prothorax testaceous with six irregular black stripes. Mesothorax testaceous along the border and with five testaceous stripes; the inner pair ramose."

In "Biologia Centrali Americana," Tab. 2, Fig. 1, *transversa* is figured by Distant. The collar, or posterior margin of the prothorax, is shown as green, and the anterior margins of the fore wings, yellowish. The collar and the anterior margin of the fore wing to end of radial area are usually of the same color, at least this is the case in the 17 specimens of *alacris* under examination at this time. Three males are from Vera Cruz without date; a female from Puerto Mexico, Vera Cruz, dry bushes near the sea-shore, 26 June, 1928, from Dr. Dampf; male Frontera, Tabasco, sea level on light, 9 June, 1928, from Dr. Dampf; male and female, Yucatan, Progreso, Cerro Isla Cienaga, 30 July, 1932 (E. P. Creaser). These specimens are blackish variegated with olivaceous or olivaceous yellow.

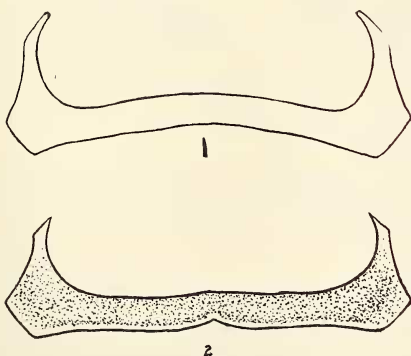
In addition to the above there are ten females of what is here designated an orange variety, of a very different appearance, which show some structural variation. If a male were at hand it would likely prove to be a distinct species.

Diceroprocta alacris (Stål). Variety *campechensis*, new variety. (Plate XXIV, Fig. 2.)

Type female from Laguna de Terminos, Campeche, Mexico, September 11, 1936 (H. D. Thomas). Collection University of Kansas.

The broad orange collar has a noticeable indentation or sinus centrally on the hind margin not observed in the olivaceous yellow form. Also the collar is rather conspicuously flecked with a multitude of fine streak-like dark spots. The costal margin of the fore wings is orange to end of radial area. General color of the body above brown, with an irregular black band connecting the eyes; ocelli ruby colored. Pronotum brown with the grooves black and black along the anterior margin of the orange collar, which has a noticeable marginal black spot at each extremity. Mesonotum brown, the four obconical spots black, the two innermost rather small. Hind margin orange, except the X which is pale brown or orange in some of the paratypes. Abdomen dark brown or black above with the hind margin of each segment often paler, or brownish-green.

The ten females, including the type, collected by Mr. H. D. Thomas, September 11, 1936, occurred in very tall grass six or



1. *Diceroprocta alacris*
2. *D. alacris* var. *campechensis*

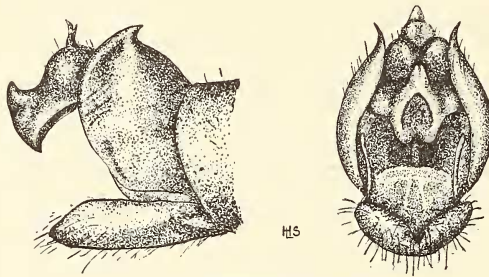
MEASUREMENTS IN MILLIMETERS

	Female Type
Length of body	25
Width of head across eyes	10
Expanse of fore wings	80
Greatest width of fore wing	11

seven feet high, along Rio Chumpan at Hacienda Balchacaj, located about the middle of the south shore of Laguna de Terminos, Campeche, Mexico.

Diceroprocta bakeri (Distant). (Plate XXIV, Fig. 4.)

This species was described as *Rihana bakeri* in the "Pomona College Journal of Entomology," Vol. iii, No. 3, September, 1911, from specimens collected by D. L. Crawford at Cuernavaca, Mex-



DICEROPROCTA BAKERI

ico. Distant states that: "By the markings of the tegmina, allied to *R. swalei* Dist." In the collection of Cornell University there are three additional males from Cuernavaca collected by Crawford and labeled *Rihana bakeri*. In the writer's collection there are five males and a female from the type locality collected June, 1922, by Mrs. E. P. Hinton.

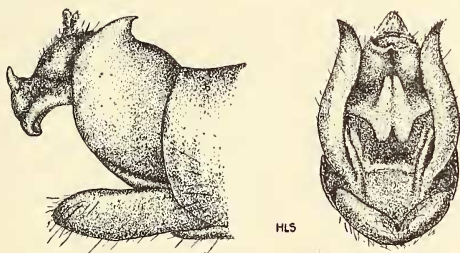
The following description of a closely allied species from Western Mexico, is modified from that of *bakeri* to cover the new species.

Diceroprocta tepicana, new species. (Plate XXIV, Fig. 3.)

Type male and allotype female from near Compostela, Nayarit, formerly Tepic, Mexico, May, 1937 (Elvira Rosenbauer). Davis collection.

Resembles in size and general color *Diceroprocta bakeri* Distant, from south central Mexico, but is larger and has the eyes more prominent and more separated at sides from pronotum; the opercula are short, oblique, apically rounded, not extending beyond the base of the abdomen with the internal angles considerably separated in the type, whereas in the 6 males of *bakeri* they more nearly touch. The notch of the last ventral segment in the female of *tepicana* is double, that is has one notch within the other, whereas in *bakeri* it is single.

Head with the front black and a small ochraceous spot at apex; vertex ochraceous almost covered by a large transverse black fascia extending between the eyes; ocelli red. Pronotum ochraceous, a central longitudinal fascia angularly dilated anteriorly and posteriorly, and the furrows black; the anterior margin narrowly and the posterior margin or collar broadly, pale ochraceous. Mesonotum ochraceous or olive green, with a large central quadrate spot united to a long obconical spot on each lateral area, black, the central spot is marked by a looped ochraceous line, and each lateral spot is outwardly ochraceous; the central spot is also narrowly longitudinally united with the basal cruciform elevation, before the anterior angles of which is a small black spot. Abdomen above blackish, the tympanal coverings and the posterior margin of each segment testaceous. Body beneath and legs almost entirely pale, with a darker central area at the base of the abdomen. The basal membranes or anal areas in both fore and hind wings grayish, and darker than in *bakeri*, while the apical portions of the fore wings are not as suffused.



DICEROPROCTA TEPICANA

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	19	20
Width of head across eyes	8	9
Expanse of fore wings	60	68
Greatest width of fore wing	8	10
Greatest width of operculum	3	

In addition to the type and allotype a single female from *Compostela* is in the writer's collection.

Diceroprocta delicata (Osborn). Variety ***aurantiaca***, new variety. (Plate XXIV, Fig. 5.)

Type male and allotype female from 10 mi. SE Pecos, Reeves County, Texas, July 11, 1936 (Dr. Raymond H. Beamer and associates). Collection University of Kansas.

Cicada delicata Osborn was described in the "Ohio Naturalist," Vol. VI, p. 498, April, 1906, from five males and one female collected at the Gulf Biologic Station, Cameron, Louisiana, by Prof. J. S. Hine and J. B. Garrett. The length was given to tip of abdomen, 18 mm., to tip of elytra, 27 mm.; width of head and eyes, 8 mm. The cross veins of the elytra deeply infuscated. "Color light green, especially pronounced on front; legs except tarsi, hinder margin of pronotum, basal portion of elytral veins, vertex, hinder portion of pronotum and disc of mesothorax, opercula and abdomen below ochery-yellow, dorsum of abdomen tinged with testaceous. A transverse irregular band produced backwardly to occiput and including the reddish ocelli and dorsal portion of front and eyes, black. The anterior portion of pronotum is marked with two spots extending from the black margins of the vertex. The anterior part of mesothorax includes four cuneiform black spots, the outer portion is also infuscated becoming a fairly distinct black posteriorly and there are two distinct black points just in front of the elevated X of the scutellum. The tip of the rostrum and claws to tarsi and spines of hind tibiae are blackened but otherwise under portion is pallid."

In this JOURNAL for March, 1916, one of the five typical males from Cameron, Cameron County, La., was figured on Plate 6, figure 2, Prof. Herbert Osborn having sent it to the writer for comparison.

Since 1916 several hundred specimens of *delicata* have been examined, and it is found that those from Louisiana and along the Gulf Coast to Brownsville, Texas, are usually pale in color and answer well the original description. Seven males from the University of Kansas, collected as far inland as San Antonio, July 4, 1936, are like many from closer to the Gulf. In Hidalgo County,

and in Starr County, as well as in neighboring counties in Texas, a darker variety appears in which the green, black and orange colors are more strongly contrasted. They, however, have the obconical spots on the mesonotum following the usual pattern, that is the outer pair longest, reaching backward to the limbs of the X. The tympana are generally black or nearly so. Mr. Paul C. Avery has sent me about 250 of this form from Mission, Hidalgo County. In 1928 the writer noted in connection with the 140 specimens of *delicata* collected by the University of Kansas expedition of that year, that the 8 collected on July 30 in Starr County, and the 34 collected July 28 and August 14 in Hidalgo County, had the colors darker and more contrasted than the 18 from Cameron County, August 3, and the 80 from Aransas County collected August 6 and 9th.

The darker colored form of *delicata* extends up the Rio Grande until the vicinity of Eagle Pass or the 100th meridian, is reached, when a greater change takes place. The appearance of the cicadas is so changed that they might be considered to be of a different species from the small, pale individuals found in the vicinity of the coast, if it were not for the intermediate forms. The insects average larger than the typical form; are orange in color; the dorsum of the abdomen somewhat darker, and the veins bordering the marginal areas of the fore wings are often heavily infuscated. The inner pair of obconical spots on the mesonotum are as in the coastal form, but the outer pair are greatly reduced, being often represented by very small triangular black marks. The legs are orange.

For this variety or geographic race, as described above, the name *aurantiaca* is proposed.

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	22	22
Width of head across eyes	8	9
Expanse of fore wings	58	62
Greatest width of fore wing	9	9.5
Greatest length of operculum	4	

In addition to the type and allotype, 41 male and 3 female topotypes, collected July 11, 1936, have been examined, as well as 4 males and one female collected July 11, 1936, at Malaga, New Mexico, by Dr. Raymond H. Beamer and his associates. A single male *aurantiaca*, labeled Pecos River, Sheffield, Texas, July 4, 1917, has been sent to me by Dr. H. H. Knight. In the collection of the Museum of Zoology, University of Michigan, there are 45 examples of *aurantiaca* collected July 22, 1935, by I. J. Cantrall, along the Pecos River in Texas at Barstow in Ward County and Pecos in Reeves County. At Del Rio the specimens collected on the low land near the Rio Grande by George P. Engelhardt and the writer, July 9, 1931, belong to *aurantiaca*, but in several individuals show a nearer approach in color characters to the eastern form than do the specimens from Pecos County. This is also true of 6 specimens from Uvalde County, Texas, collected by Dr. Knight, July 2, 1917.

In his thesis on: "The Cicadas of Texas," June, 1936, F. F. Bibby mentions several color forms of *delicata*, including the one here described as variety *aurantiaca*.

Mr. Paul C. Avery reports *delicata* found on land subject to overflow, or at least damper than adjoining land, and often on willow. He has collected the species at Mission, Hidalgo County, Texas, from June to September, and J. W. Monk found it in 1933 at Donna, in Hidalgo County, as late as October 16.

A similar variation toward an orange color has been shown to exist in *Diceroprocta cinctifera* as the Rio Grande is ascended. Individuals with greenish or yellowish-green collar and front margin to the fore wings, known as variety *viridicosta* Davis, are found from the Gulf to about Eagle Pass, replaced further up the river in Texas and New Mexico by the typical *cinctifera* Uhler. Along Limpia Creek, a branch of the Pecos River, *Diceroprocta cinctifera* variety *limpia* Davis is found. (See JOUR. N. Y. ENT. Soc., March, 1930, p. 60, and June, 1932, p. 246.)

Proarna cocosensis Davis

This species was described and figured in this JOURNAL for June, 1935, page 191, from two males and one female. The cicadas in the Carnegie Museum at Pittsburgh, Pa., were ex-

amed June 5, 1936, and Dr. Hugo Kahl showed me seven males, six females and a number of nymphal skins of *cocosensis* collected February 10, 1936, by Reynold L. Fricke, when the yacht "Vagabondia" visited Cocos Island. Some of these have been compared with the specimens included in the original description, and the characteristic heavy Culb vein in the fore wings found to be the same.

Herrera lugubrina (Stål)

In "Biologia Centrali Americana," Rhynch. Hom., *Carineta lugubrina* Stål, Stett. Ent. Zeit. xxv, p. 57 (1864), is figured. In his 1906 Catalogue Distant places it in the genus *Herrera*. The original description states that it is blackish, opaque with the tegmina and wings dirty vitreous veined with fuscous. Long 10-13, expanse of tegmina 30-36 mill. The head rather obtuse and the thorax in front a little wider than the head and eyes with the lateral margins parallel towards apex beyond the middle wider at base with a transverse groove quite near the hind margin.

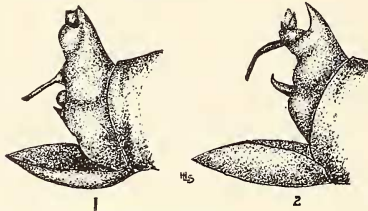
In the writer's collection there are 95 specimens from Compostela, Nayarit, Mexico, that resemble this species, but Mr. W. E. China of the British Museum, who has kindly compared specimens from this series states that they "appear to represent a new species." As so many of the cicadas from Compostela have proved to be undescribed it is likely that this *Herrera* should at least be separated as a variety of *lugubrina* pending the accumulation of more specimens.

Herrera lugubrina (Stål). Variety **compostelensis**, new variety. (Plate XXIV, Fig. 7.)

Type male, allotype female, Compostela, Nayarit, Mexico, August, 1936. Davis collection.

Paler than *lugubrina*, and pronotum rarely blackish. Front pale yellowish or greenish yellow; black band connecting eyes; pronotum yellowish or olivaceous, with a central band bifurcated in front; grooves blackened and an oblique black spot each side near the collar, which has the anterior margin black and the posterior margin pale. Mesonotum with four obconical marks; the X olivaceous, with a fuscous spot immediately in front. Abdomen

greenish yellow with a dorsal row of spots, sometimes absent or nearly so; also a row of spots each side which extend over the margin to the underside, where there is a median row of spots. In the males the spots usually do not extend quite to the end of the abdomen. Legs pale, striped with black. Membranes at base of fore and hind wings yellowish.



1. HERRERA LATI-CAPITATA
2. H. LUGUBRINA VAR. COMPOSTELENSIS

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	12	13.5
Width of head across eyes	4	4
Expanse of fore wings	34	35
Greatest width of fore wing	7	7

This insect occurs in July and August, and as it has been taken for the past six years, must be fairly common.

Herrera laticapitata new species. (Plate XXIV, Fig. 8.)

Type male and allotype female from Huixtla Valley near Vergel, Chiapas, Mexico, June 24, 1935. Found on a tree, and received from Dr. A. Dampf to whom the type has been returned.

Differs from the description of *Herrera (Carineta) lugubrina* Stål, and variety *compostelensis* Davis, in having the head across the eyes broader than the front part of the pronotum. Also the front of the head is much more tumid and prominent. It is blackish with "tegmina and wings dirty vitreous varied with fuscous," as in *lugubrina*, but the membranes at base of fore and hind wings dark olivaceous and not yellowish. Front olivaceous, a broad black band connecting the eyes. Pronotum olivaceous with a central band bifurcated in front and joining the black collar at the posterior margin. The hind margin of the collar is not narrowly pale, nor are the grooves blackened. Mesonotum with the usual four obconical marks; X olivaceous with a fuscous

spot in front. Abdomen clouded with fuscous. Beneath, the head, except the pale front, black; the pronotum and mesonotum mottled with black. Abdomen paler than the thorax and without the central longitudinal dark band of spots as in *lugubrina* variety *compostelensis*. Legs pale; opercula small, arcuate, apically fuscous and not bordered with pale.

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	13	14
Width of head across eyes	5	5
Expanse of fore wings	38	37
Greatest width of fore wing	7	6.5

Okanagana aurora Davis

At the time this beautiful insect was described (JOUR. N. Y. ENT. SOC., June, 1936) but three specimens were known to me, all collected near Mammoth, Mono County, California. Three additional specimens, two males and a female, collected at McGee Creek, Mono County, California, July 7, 9 and 11, 1932, have been examined in the collection of the Carnegie Museum, Pittsburgh, Pa.

Okanagana tanneri Davis

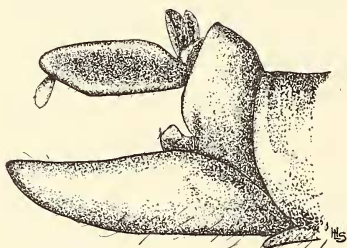
This insect was described in this JOURNAL, March, 1930, from three males collected at Woodside, Emery County, Utah, and later Prof. Tanner sent five males and twelve females taken at the same locality and time as the type. A male collected at Gateway, Mesa County, Colorado, June 29, 1932 (L. G. Davis) is in the collection of the University of Kansas, and on June 18, 1933, Prof. G. F. Knowlton, collected two males at Cedar, Emery County, Utah, one of which was kindly presented to the writer. Other specimens examined, sent by Dr. John W. Sugden, have been, male, June 10, 1934, Orangeville, Emery County, and male, June 15, 1935, Price, Carbon County, Utah. This form which is now regarded as a distinct species was described in 1930, as a "showy black and pale straw-colored insect," and it was further stated that: "Both pairs of wings at base, as well as the anal membranes, are pale straw-colored."

Lately Dr. John W. Sugden, of Salt Lake City, sent me the following species, here described as new.

Okanagana sugdeni, new species.

Type male and allotype female, Orangeville, Emery County, Utah, June 21, 1934. Type in Sugden collection.

This remarkable appearing species has the anal membranes of both pairs of wings blood-red instead of pale straw-color. Also the black tergum has the segments margined posteriorly with dark red instead of straw-color, and the valve of the male is reddish or blackish. Beneath, the pale straw-color areas of *tanneri* are replaced by red. The last abdominal segment of the female is nearly all black, instead of being black at base only.



OKANAGANA SUGDENI

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	29	28
Width of head across eyes	7.5	8
Expanse of fore wings	71	75
Greatest width of fore wing	12	13

NOTE: Since the examination of the type and allotype, Dr. Sugden has sent 15 paratypes collected at Orangeville, Utah, June 10 and 21, 1934. The wings lack the yellowish color of *tanneri*, and are clear and much more transparent. In several the pronotum is black edged all around with reddish.

***Okanagana rimosa* Say, and the Development of Supernumerary Cross Veins in the Fore Wings.**

On July 1, 1937, Dr. A. E. Brower collected four male and fifty-six female specimens of *Okanagana rimosa* Say, in the blueberry

barrens at Aurora, Maine, and kindly sent them to me. It was observed that while they showed hardly any variation in size or color pattern, twelve of the females exhibited variations in the first cross vein, the second cross veins of the fore wings being normal. In three examples, the first cross vein was doubled in both of the fore wings, while the remaining nine had the first cross vein either doubled or forked in but one of the fore wings.

In this JOURNAL for June, 1936, there is a note on the development of a supernumerary vein extending from vein C_ul into the 8th marginal area of the fore wing in seventy-seven of the three hundred and four specimens of *Okanagana magnifica* Davis, in the writer's collection. The specimens came from Arizona, New Mexico and Colorado.

It is of interest that these variations in the venation of the fore wings should be thus localized in the two species, and it may be added that variation in the cross veins, to some slight extent, is not uncommon.

Okanagana pallidula Davis, Its Distribution and Color Forms.

This species was described and figured in this JOURNAL for December, 1917, from ten males collected in Merced County, California. It was described as: "A yellowish insect, almost unicolorous, with the membrane or flaps at the base of the wings orange." The cicadas were captured while singing, so the supposition that they were immature could not be entertained. In this JOURNAL for 1919, page 187, the insect is said to be: "Yellowish or yellowish green; front conical and prominent. Expands about 50 mm." Sixty-five specimens are recorded in the JOURNAL for March, 1930, collected in 1929 at Bakersfield, Kern County, in Merced County and in Yolo County, California. Dr. R. H. Beamer wrote that they were exceptionally common in 1929 in California's great Central Valley, and as far as has been learned in later years *pallidula* is confined to this valley, occurring from May to August inclusive. All of the specimens examined to 1930 were pale, being either yellowish or pale greenish.

In 1933 Dr. R. H. Beamer of the University of Kansas, sent to me for examination 47 males and 2 females from Mojave, Kern County, California, collected July 7, 1933. In this lot appeared

the first dark colored individuals seen by me, one male being almost black.

In 1936, Mr. F. T. Scott sent 154 *pallidula*, and wrote the cicadas had been quite common in the San Joaquin Valley that year. "It seems to be associated with alkali Mallow and never gets very high off the ground, in fact is rather commonly found in its hole, and may sometimes be lifted out on a straw. Almost half the specimens from this sending were greenish in color when captured, but soon faded." This species has a "very thin light song," and it has been found singing while on the ground with its head out of a hole, as observed by Alonzo C. Davis, in Merced County, July, 1917.

In the lot of 154 sent by Mr. Scott in 1936, there were, from Knight's Landing, Yolo County, a number of pale specimens, a greater number showing some dark color, particularly on the mesonotum, as well as six black males. As this insect was described as pale yellowish or greenish, as indeed most of them are, it would appear, that as there are occasional black specimens, that they should be given a variety name.

Okanagana pallidula Davis. Variety **nigra**, new variety.
(Plate XXIV, Fig. 6.)

Type male, Knight's Landing, Yolo County, California, July 20, 1936 (F. T. Scott). Davis collection.

Resembles in size and color many examples of *Okanagana vanduzeei* and *O. consobrina*, but may be separated by the front of the head being more tumid, in lacking the many hairs on the dorsal surface of the head and pronotum, and in the absence of an inner ventral notch on the underside of the female, present in *vanduzeei* and its forms. The front wings are narrower than

MEASUREMENTS IN MILLIMETERS

	Male Type
Length of body	21
Width of head across eyes	6
Expanse of fore wings	51
Greatest width of fore wing	8

in *consobrina*. The pronotum has the hind margin pale and side margins black in the type, but the side margins may also be pale. The basal cell of the fore wings in the type and six of the paratypes is clouded, as in *vanduzeei*, and nearly clear in one, as in the connecting color forms collected at the same place and time.

Though recorded only from Yolo and Kern counties, variety *nigra* should be found elsewhere in the Sacramento and San Joaquin Valley.



PLATE XXIV

- Figure 1. *Tibicen marginalis* variety *pronotalis*. Type.
Figure 2. *Diceroprocta alacris* variety *campechensis*. Type.
Figure 3. *Diceroprocta tepicana*. Type.
Figure 4. *Diceroprocta bakeri* (Distant).
Figure 5. *Diceroprocta delicata* variety *aurantiaca*. Type.
Figure 6. *Okanagana pallidula* variety *nigra*. Type.
Figure 7. *Herrera lugubrina* variety *compostelensis*. Type.
Figure 8. *Herrera laticapitata*. Type.

